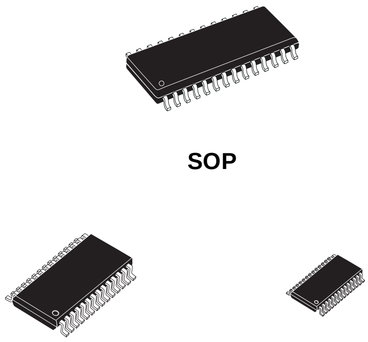
ST3241E

±15KV ESD PROTECTED 3 TO 5.5V, 400KBPS, RS-232 TRANSCEIVER WITH AUTO-POWERDOWN

- ESD PROTECTION FOR RS-232 I/O PINS: ±8KV IEC 1000-4-2 CONTACT DISCHARGE ±15KV HUMAN BODY MODEL
- 1µA SUPPLY CURRENT ACHIEVED WHEN IN AUTO-POWERDOWN
- 250Kbps MINIMUM GUARANTEED DATA RATE
- GUARANTEED 6V/µs SLEW RATE RANGE
- GUARANTEED MOUSE DRIVEABILITY
- 0.1µF EXTERNAL CAPACITORS
- MEET EIA/TIA-232 SPECIFICATIONS DOWN TO 3V
- AVAILABLE IN SO-28, SSOP28 AND TSSOP28 PACKAGES



DESCRIPTION

The ST3241E device consists of 3 drivers, 5 receivers and a dual charge-pump circuit. The device meets the requirements of EIA/TIA and V.28/V.24 comunication standards providing high data rate capability and enhanced electrostatic discharge (ESD) protection. All transmitter outputs and receiver input are protected to ±8KV USING IEC 1000-4-2 contact discharge and ±15KV using the Human Body Model. The receiver R2 is always active to implement a wake-up feature for serial port.

The ST3241E has a proprietary low-dropout transmitter output stage enabling true RS-232 performance from a 3.0V to 5.5V supply with a dual charge pump. The device is guaranteed to run at data rates of 250kbps while maintaining RS-232 output levels.

It is a complete serial port (3 drivers, 5 receivers) intended for notebook or subnotebook computers. Receivers R1 and R2 have extra outputs in addition to their standard outputs. These extra outputa are always active.
Typical application are in notebook, subnotebook, palmtop computers, battery-powered equipment, hand-held equipment, peripherals and printers.

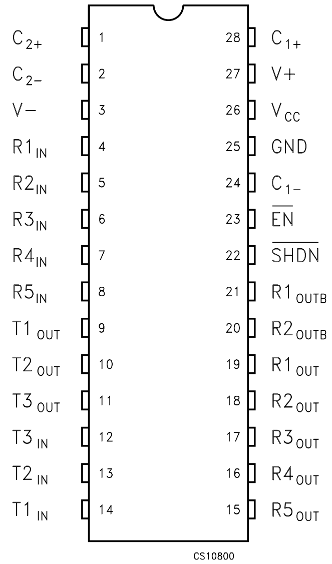
ORDERING CODES

Type	Temperature Range	Package	Comments
ST3241ECD	0 to 70 °C	SO-28 (Tube)	27parts per tube / 12tube per box
ST3241EBD	-40 to 85 °C	SO-28 (Tube)	27parts per tube / 12tube per box
ST3241ECDR	0 to 70 °C	SO-28 (Tape & Reel)	1000 parts per reel
ST3241EBDR	-40 to 85 °C	SO-28 (Tape & Reel)	1000 parts per reel
ST3241ECPR	0 to 70 °C	SSOP-28 (Tape & Reel)	1350 parts per reel
ST3241EBPR	-40 to 85 °C	SSOP-28 (Tape & Reel)	1350 parts per reel
ST3241ECTR	0 to 70 °C	TSSOP28 (Tape & Reel)	2500 parts per reel
ST3241EBTR	-40 to 85 °C	TSSOP28 (Tape & Reel)	2500 parts per reel

PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1	C_2+	Positive Terminal of Inverting Charge Pump Capacitor
2	C_2-	Negative Terminal of Inverting Charge Pump Capacitor
3	V-	-5.5V Generated by the Charge Pump
4	$R1_{IN}$	First Receiver Input Voltage
5	$R2_{IN}$	Second Receiver Input Voltage
6	$R3_{IN}$	Third Receiver Input Voltage
7	$R4_{IN}$	Fourth Receiver Input Voltage
8	$R5_{IN}$	Fifth Receiver Input Voltage
9	$T1_{OUT}$	First Transmitter Output Voltage
10	$T2_{OUT}$	Second Transmitter Output Voltage
11	$T3_{OUT}$	Third Transmitter Output Voltage
12	$T3_{IN}$	Third Transmitter Input Voltage
13	$T2_{IN}$	Second Transmitter Input Voltage
14	$T1_{IN}$	First Transmitter Input Voltage
15	$R5_{OUT}$	Fifth Receiver Output Voltage
16	$R4_{OUT}$	Fourth Receiver Output Voltage
17	$R3_{OUT}$	Third Receiver Output Voltage
18	$R2_{OUT}$	Second Receiver Output Voltage
19	$R1_{OUT}$	First Receiver Output Voltage
20	$R2_{OUTB}$	Non-inverting Complementary Receiver Output, always active for wake-up
21	$R1_{OUTB}$	Non-inverting Complementary Receiver Output, always active for wake-up
22	$\overline{SHDN}$	Shutdown Control. Active Low.
23	$\overline{EN}$	Receiver Enable. Active Low
24	C_1-	Negative Terminal of Voltage- Charge Pump Capacitor
25	GND	Ground
26	V_{CC}	Supply Voltage
27	V+	5.5V Generated by the Charge Pump
28	C_1+	Positive Terminal of Voltage- Charge Pump Capacitor

PIN CONFIGURATION



SHUTDOWN AND ENABLE CONTROL TRUTH TABLE

$\overline{SHDN}$	$\overline{EN}$	T_{OUT}	R_{OUT}	R_{OUTB}
0	0	HIGH Z	ACTIVE	ACTIVE
0	1	HIGH Z	HIGH Z	ACTIVE
1	0	ACTIVE	ACTIVE	ACTIVE
1	1	ACTIVE	HIGH Z	ACTIVE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.3 to 6	V
V+	Extra Positive Voltage (Note 1)	(V_{CC} -0.3) to 7	V
V-	Extra negative Voltage (Note 1)	0.3 to -7	V
V+ +|V-|	(Note 1)	13	V
$\overline{SHDN}$, $\overline{EN}$, T_{IN}	Input Voltage	-0.3 to 6	V
R_{IN}	Receiver Input Voltage Range	± 25	V
T_{OUT}	Transmitter Output Voltage Range	± 13.2	V
R_{OUT} R_{OUTB} $\overline{INVALID}$	Receiver Output Voltage Range	-0.3 to (V_{CC} + 0.3)	V
t_{SHORT}	Short Circuit Duration on T_{OUT} (one at a time)	Continuous	
T_{stg}	Storage Temperature Range	-65 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Note 1: V+ and V- can have magnitude of 7V, but their absolute difference cannot exceed 13V

ESD PERFORMANCE: TRANSMITTER OUTPUTS, RECEIVER INPUTS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
ESD	ESD Protection Voltage	Human Body Model	± 15			KV
ESD	ESD Protection Voltage	IEC 1000-4-2 (Contact Discharge)	± 8			KV

ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SUPPLY}	Supply Current	No load V_{CC} = 3.3V or 5V, T_A = 25°C		0.3	1	mA
I_{SHDN}	Shutdown Supply Current	SHDN = GND, T_A = 25°C		1	10	µA

LOGIC INPUT AND RECEIVER OUTPUT ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{TIL}	Input Logic Threshold Low	T_{IN}, $\overline{EN}$, $\overline{SHDN}$			0.8	V
V_{TIH}	Input Logic Threshold High	V_{CC} = 3.3V V_{CC} = 5V	2 2.4			V V
I_{IL}	Input Leakage Current	T_{IN}, $\overline{EN}$, $\overline{SHDN}$		± 0.01	± 1.0	µA

RECEIVER OUTPUT ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{OL}	Output Leakage Current	R_{OUT}, $\overline{EN}$, Receiver Disabled		± 0.05	± 10	µA
V_{OL}	Output Voltage Low	I_{OUT} = 1.6mA			0.4	V
V_{OH}	Output Voltage High	I_{OUT} = -1mA		V_{CC}-0.6	V_{CC}-0.1	V

TRANSMITTER ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{TOUT}	Output Voltage Swing	All Transmitter outputs are loaded with 3KΩ to GND	± 5	± 5.4		V
R_{OUT}	Output Resistance	V_{CC} = V+ = V- = 0V V_{OUT} = ± 2V	300	10M		Ω
I_{SC}	Output Short Circuit Current	V_{CC} = 3.3V		± 35	± 60	mA
I_L	Output Leackage Current	V_{CC} = 0 to 5.5V, trasmitter output = ± 12V, trasmitter disabled			± 25	mA
V_{TO}	Transmitter Output Voltage	T1IN = T2IN = GND, T3IN = V_{CC} T3OUT loaded with 3KΩ to GND T1OUT and T2OUT loaded with 2.5mA each	± 5			V

RECEIVER ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified. Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{RIN}	Receiver Input Voltage Operating Range		-25		25	V
V_{RIL}	RS-232 Input Threshold Low	T_A = 25°C V_{CC} = 3.3V T_A = 25°C V_{CC} = 5.0V	0.6 0.8	1.2 1.5		V
V_{RIH}	RS-232 Input Threshold High	T_A = 25°C V_{CC} = 3.3V T_A = 25°C V_{CC} = 5.0V		1.5 1.8	2.4 2.4	V
V_{RIHYS}	Input Hysteresis			0.3		V
R_{RIN}	Input Resistance	T_A = 25°C	3	5	7	KΩ

TIMING CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified. Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
D_R	Maximum Data Rate	R_L = 3KΩ C_L= 1000pF one trasmitter switching	250			Kbps
t_{PHL} t_{PLH}	Receiver Propagation Delay	R_{IN} to R_{OUT} C_L = 150pF		0.15		µs
t_{T_SKEW}	Transmitter Skew			100		ns
t_{R_SKEW}	Receiver Skew			300		ns
S_{RT}	Transition Slew Rate	T_A = 25°C R_L = 3K to 7KΩ V_{CC} = 3.3V measured from +3V to -3V or -3V to +3V C_L = 150pF to 1000pF C_L = 150pF to 2500pF	 6 4		 30 30	 V/µs V/µs

APPLICATION CIRCUITS

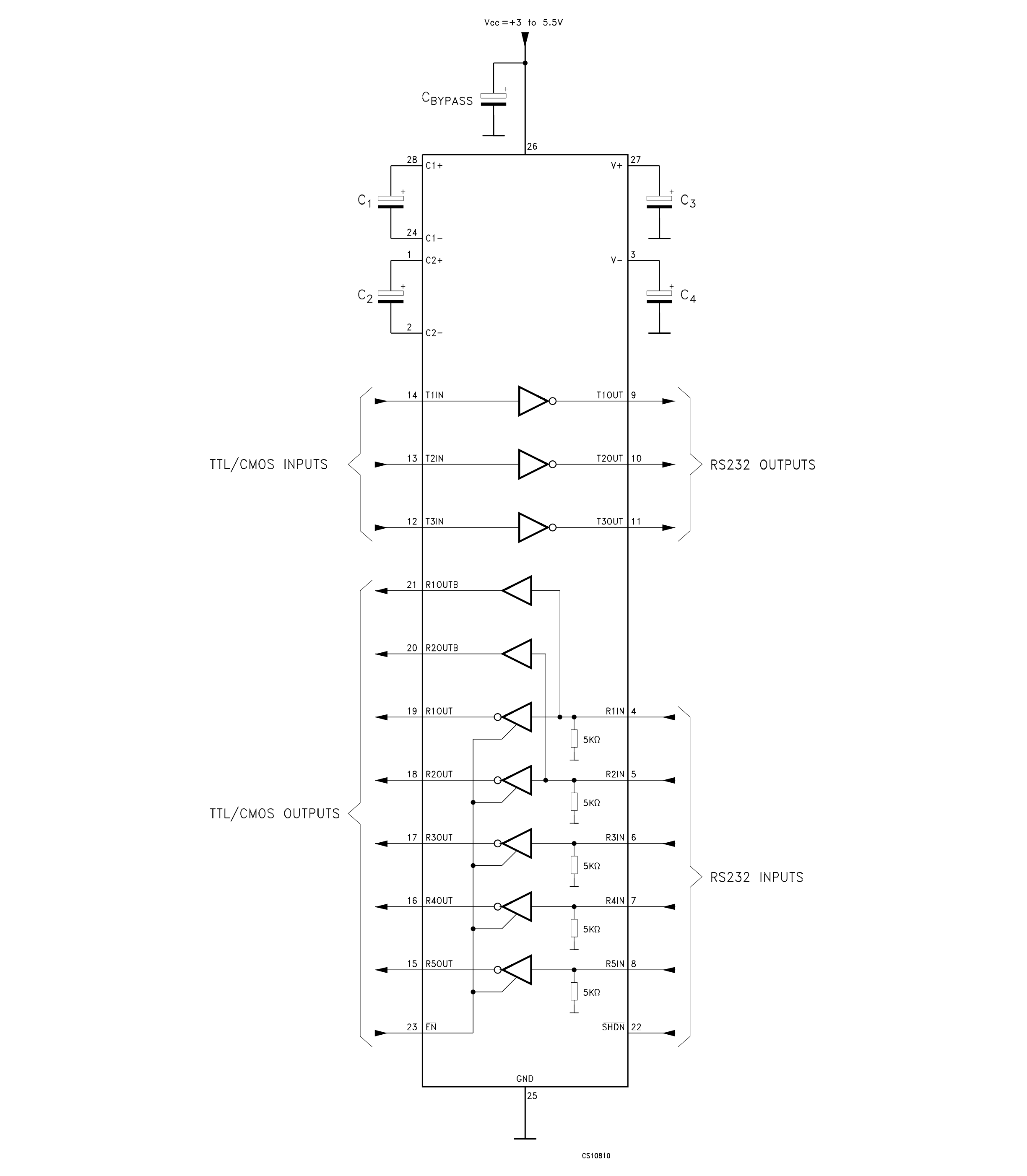
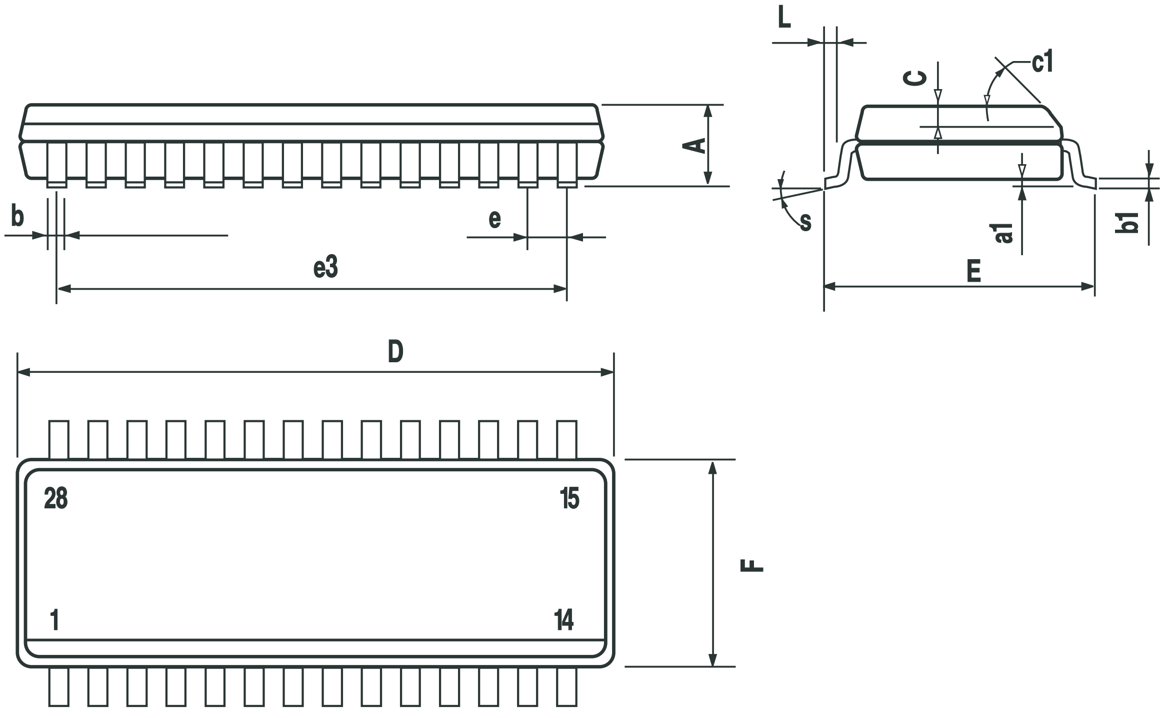


Figure 1 : REQUIRED MINIMUM CAPACITANCE VALUE (μF)

V_{CC} (V)	C_1	C_2, C_3, C_4,	C_{BYPASS}
3 to 3.6	0.1	0.1	0.1
4.5 to 5.5	0.047	0.33	0.1
3 to 5.5	0.1	0.47	0.1

SO-28 MECHANICAL DATA

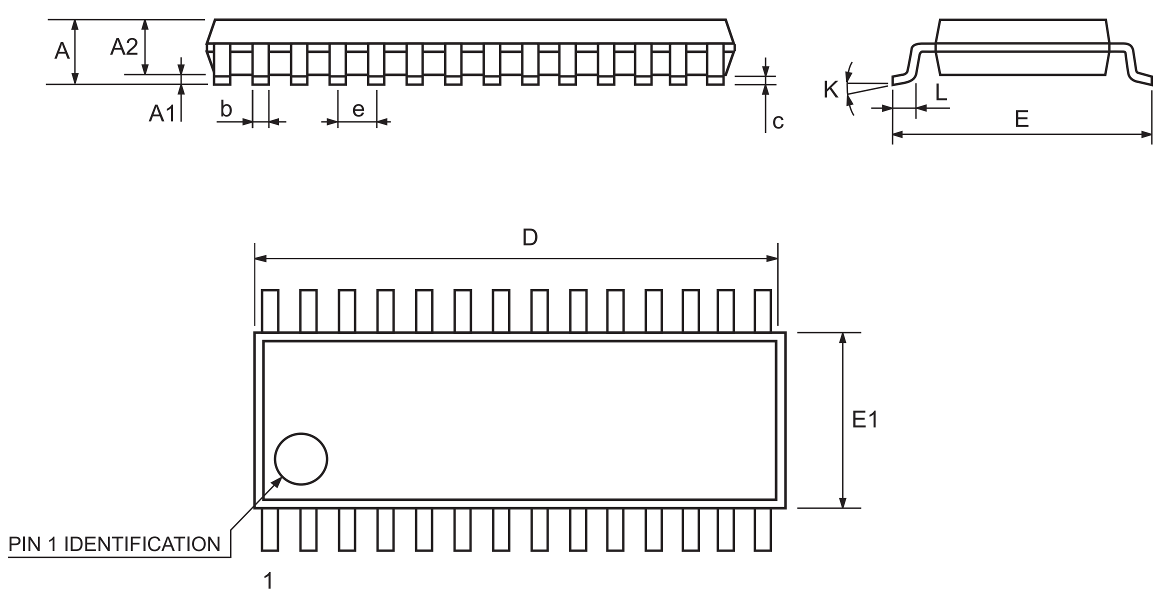
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.3	0.004		0.012
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.012
C		0.5			0.020	
c1	45° (typ.)					
D	17.70		18.10	0.697		0.713
E	10.00		10.65	0.393		0.419
e		1.27			0.050	
e3		16.51			0.650	
F	7.40		7.60	0.291		0.300
L	0.50		1.27	0.020		0.050
S	8 ° (max.)					



0016023

SSOP28 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			2			0.079
A1	0.050			0.002		
A2	1.65	1.75	1.85	0.065	0.069	0.073
b	0.22		0.38	0.009		0.015
c	0.09		0.25	0.004		0.010
D	9.9	10.2	10.5	0.390	0.402	0.413
E	7.4	7.8	8.2	0.291	0.307	0.323
E1	5	5.3	5.6	0.197	0.209	0.220
e		0.65 BSC			0.0256 BSC	
K	0°		10°	0°		10°
L	0.55	0.75	0.95	0.022	0.030	0.037



TSSOP28 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	9.6	9.7	9.8	0.378	0.382	0.386
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0˚		8˚	0˚		8˚
L	0.45	0.60	0.75	0.018	0.024	0.030

